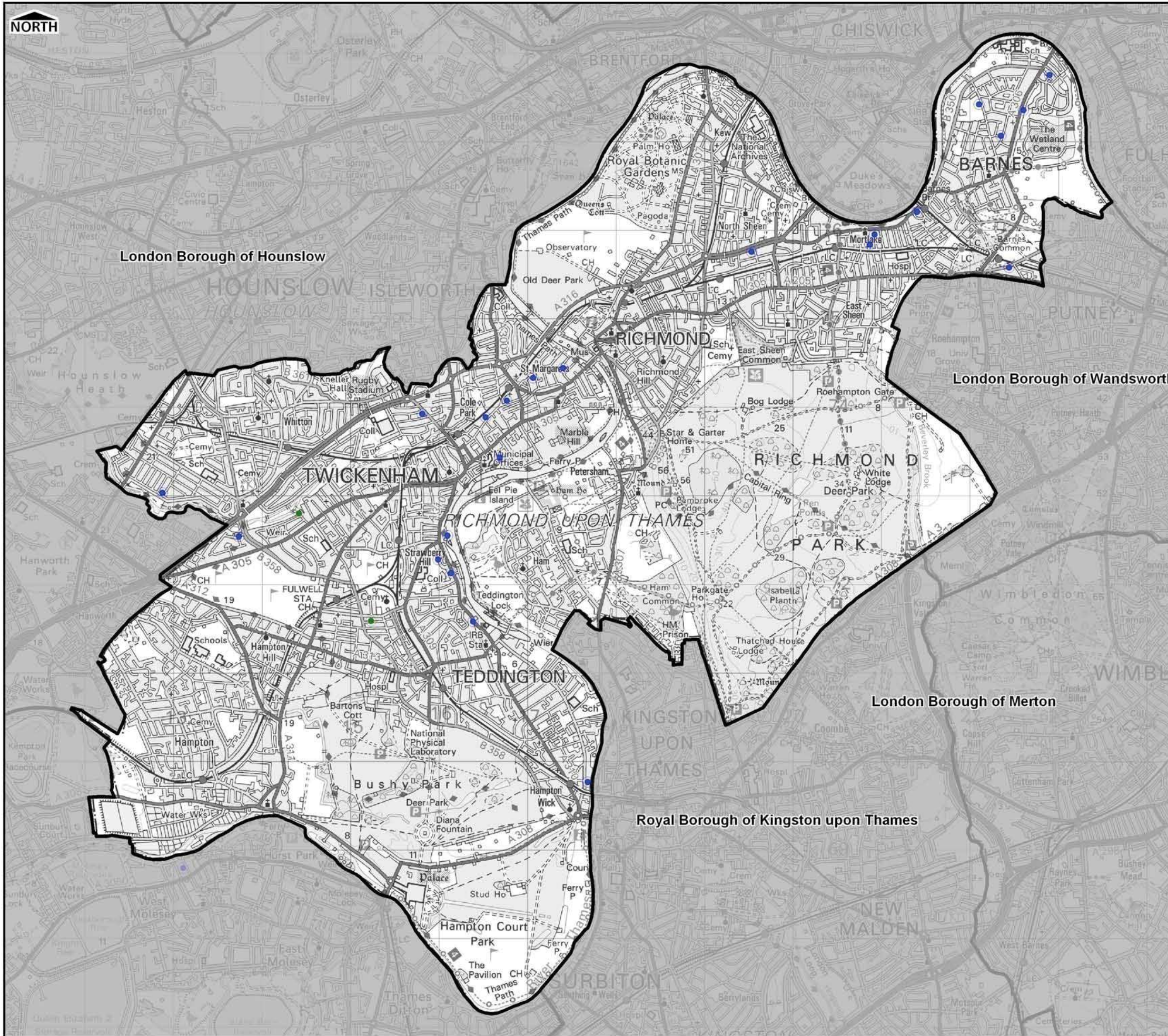


Appendix E PFRA Figures



PFRA Figures produced by Capita Symonds & Scott Wilson, dated May 2011:

- **Figure 1** 'Surface Water Flooding Incidents and Fluvial Flooding Incidents'
- **Figure 2** 'Increased Potential for Elevated Groundwater'
- **Figure 3** 'Sewer Flooding Incidents'
- **Figure 4** 'Surface Water Depth (m) 1 in 200 Chance of rainfall event occurring in any given year (0.5% AEP)'
- **Figure 5** 'Surface Water Flood Hazard Rating 1 in 200 Chance of rainfall event occurring in any given year (0.5% AEP)'
- **Figure 6** 'Surface Water Depth (m) 1 in 100 chance of rainfall event occurring in any given year (1% AEP) plus climate change'
- **Figure 7** 'Surface Water Flood Hazard Rating 1 in 100 Chance of rainfall event occurring in any given year (0.5% AEP)'

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Legend

-  Borough Administrative Boundary
-  Fluvial Flooding Incidents
-  Surface Water Flooding Incidents

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Scale at A3 1:45,000	Date 13/05/2011	Drawn by D.SKILTON	Approved by E.CRAVEN
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Surface Water Flooding Incidents and Fluvial Flooding Incidents

Consultants
CAPITA SYMONDS  URS / Scott Wilson
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 SW1P 1PL

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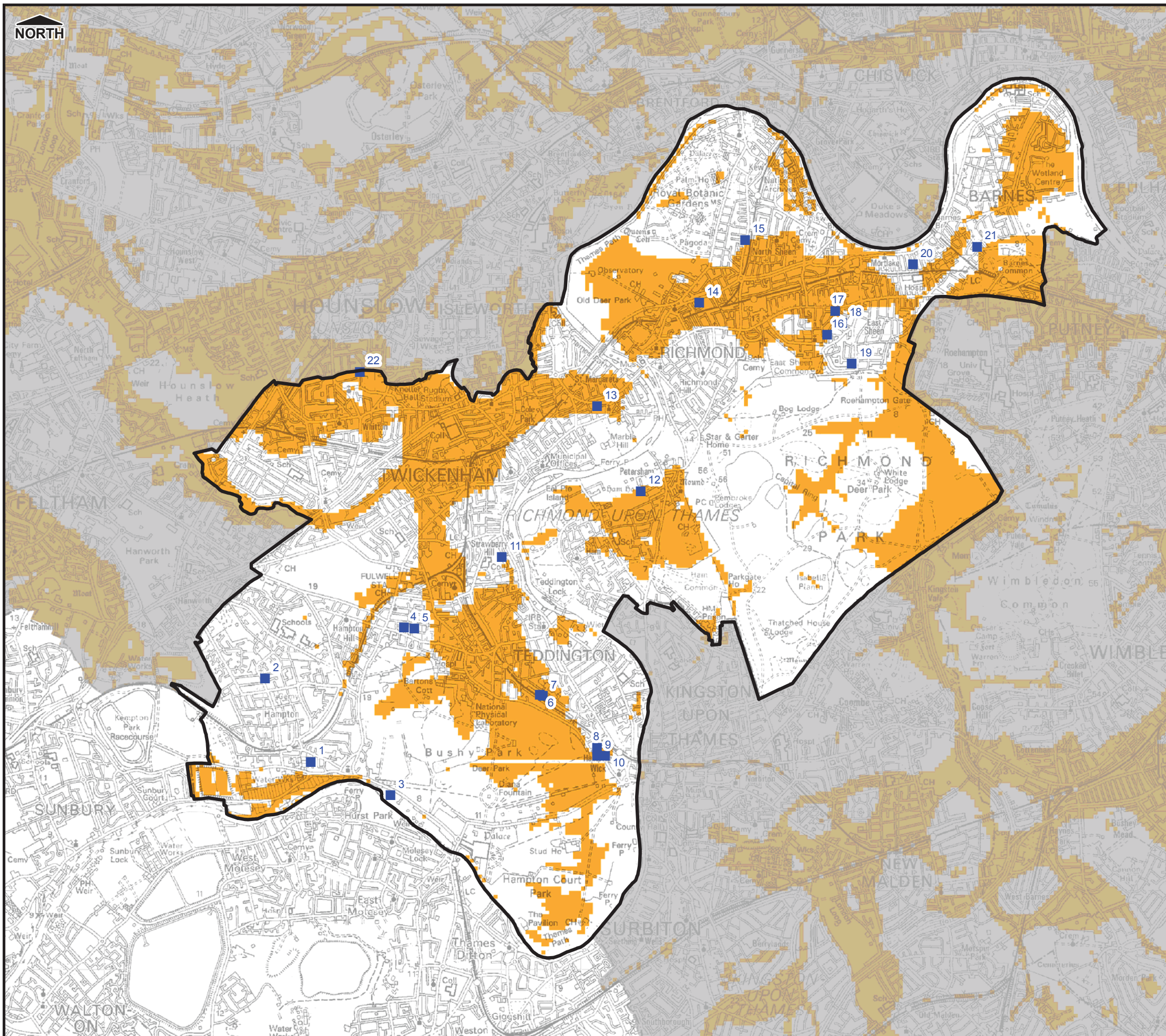
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FIGURE 1



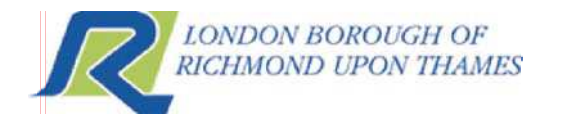
Legend

- Richmond Borough Council
- Groundwater Flood Incident (EA Records)
- Increased Potential for Elevated Groundwater in Permeable Superficial Deposits
- Consolidated Aquifers

Notes

1. The increased potential for elevated groundwater map shows those areas within the London Boroughs where there is an increased potential for groundwater to rise sufficiently to interact with the ground surface or be within 2m of the ground surface. Such groundwater rise could lead to the following:
 - Flooding of basements of buildings below ground level;
 - Flooding of buried services or other assets below ground level;
 - Inundation of farmland, roads, commercial, residential and amenity areas;
 - Flooding of ground floors of buildings above ground level; and
 - Overflowing of sewers and drains
2. Incident records shown are generally unconfirmed and may include issues such as water main bursts or non-groundwater related problems.
3. Areas not shown to have increased potential for elevated groundwater should be considered to have a low potential for elevated groundwater - Lack of information does not imply 'no potential' of elevated groundwater in that area.
4. Includes groundwater flood mapping provided by JBA consulting, Copyright. Jeremy Benn Associates Limited 2008-2011, partially derived from data supplied by the Environment Agency.

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Scale at A3 1:50,000	Date 22/03/2011	Drawn by C.Woolhouse	Approved by S.Cox
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Increased Potential For Elevated Groundwater

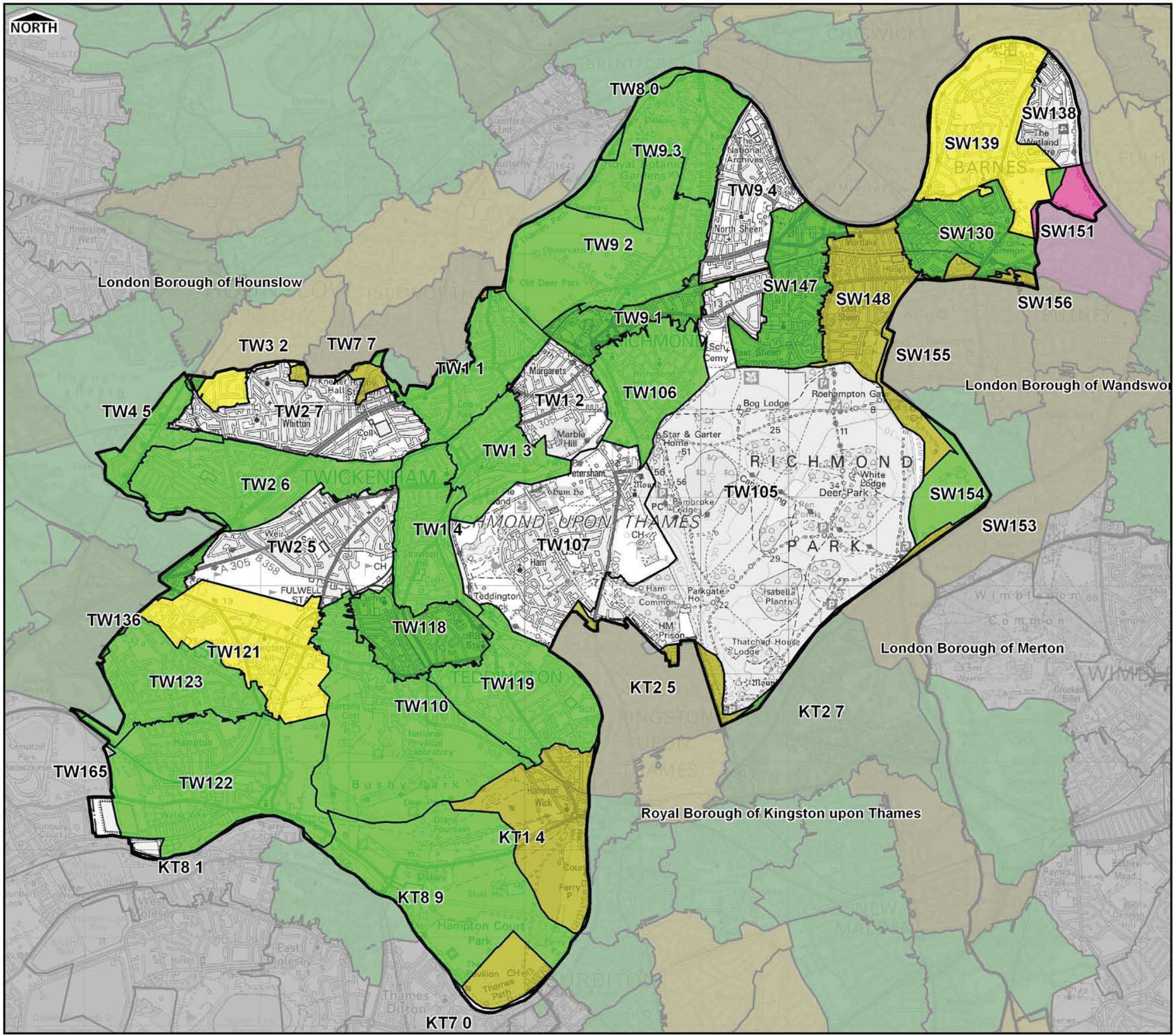
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 SW1P 1PL

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FIGURE 2



Legend

- Borough Administrative Boundary
 - Sewer Flooding Incidents
- No. of Sewer Flood Records
- None
 - 1 - 5
 - 6 - 10
 - 11 - 20
 - 21 - 50
 - 51 - 100
 - 101+

Notes

1. Sewer flood records relate to internal and external flooding of properties
2. Data supplied by Thames Water Ltd and is correct as at June 2010
3. Point data supplied by Borough Council

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Sewer Flooding Incidents

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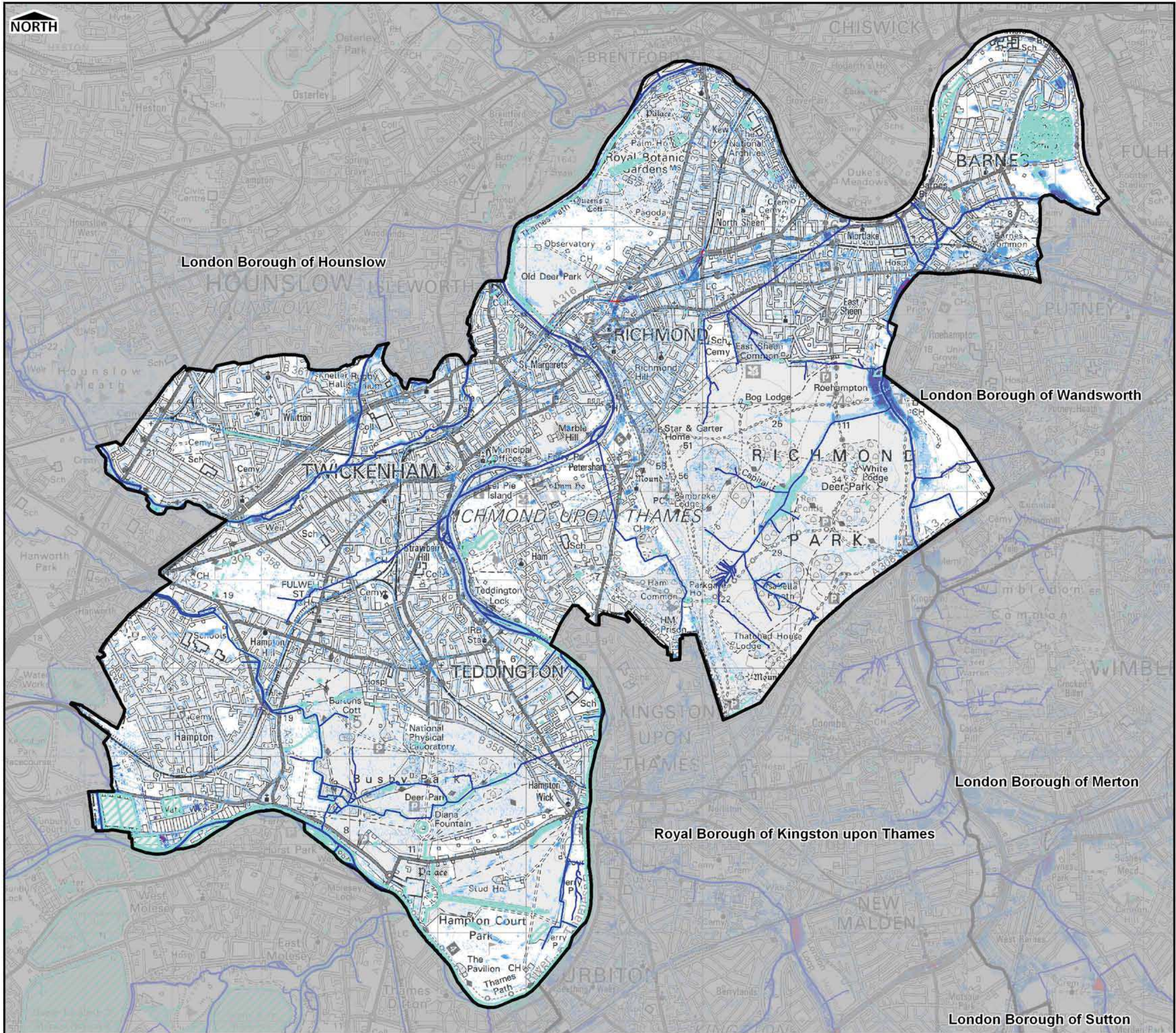
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FIGURE 3





Legend

- Borough Administrative Boundary
- Permanent Water Bodies
- Main River
- Ordinary Watercourse

Flood Depth

- <math><0.1\text{m}</math>
- 0.1m to 0.25m
- 0.25m to 0.5m
- 0.5m to 1.0m
- 1.0m to 1.5m
- >1.5m

Notes

1. This map only shows the predicted likelihood of surface water flooding (this includes flooding from sewers, drains, small watercourses and ditches that occurs in heavy rainfall) for defined areas, and due to the coarse nature of the source data used, are not detailed enough to account for precise addresses.
2. Users of this map should refer to section 3.2 of the Surface Water Management Plan for a complete description of limitations and accuracy of the flood/hazard extents shown.
3. This map provides a strategic overview of surface water flood risk and may be subject to further analysis in the future.

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**Surface Water Depth (m) 1 in 200
 Chance of rainfall event occurring
 in any given year (0.5% AEP)**

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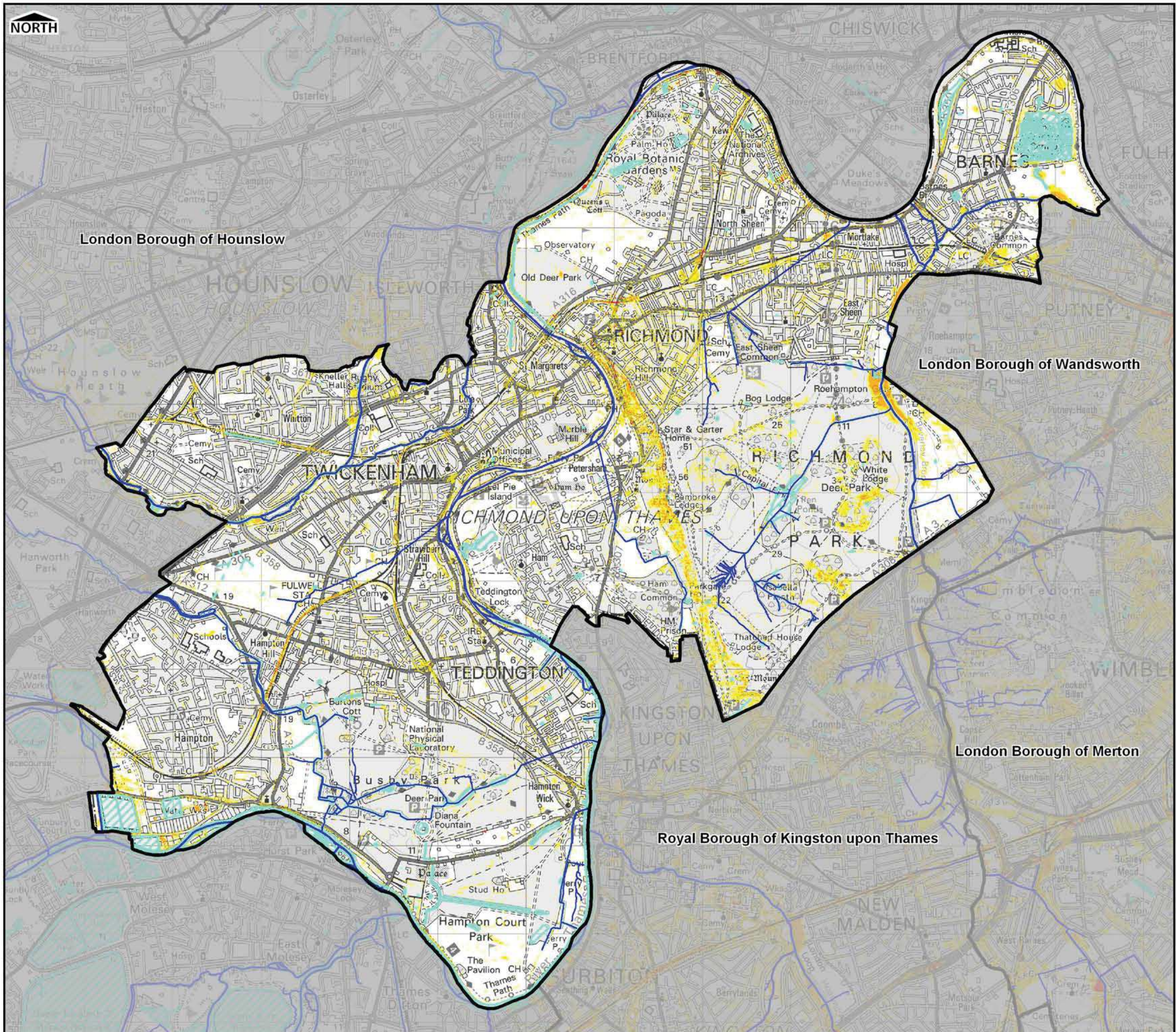
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FIGURE 4



Legend

- Borough Administrative Boundary
- Permanent Water Bodies
- Main River
- Ordinary Watercourse

Flood Hazard

- <0.75 Caution (Very low hazard)
- 0.75 - 1.25 Moderate (Danger for some)
- 1.25 - 2.0 Significant (Danger for most)
- >2.0 Extreme (Danger for all)

Notes

- Flood Hazard has been defined based upon the joint EA and Defra R&D Technical Report FD2320 (January 2006).
- Degree of flood hazard can be interpreted as follows:
 - Caution: Flood zone with shallow flowing water or deep standing water
 - Moderate: Flood zone with deep or fast flowing water. Dangerous for children, the elderly and the infirm
 - Significant: Flood zone with deep fast flowing water. Dangerous for most people.
 - Extreme: Flood zone with deep fast flowing water. Dangerous for all (including emergency services)

London Borough of Richmond

LONDON BOROUGH OF RICHMOND UPON THAMES

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Scale at A3 1:45,000	Date 13/05/2011	Drawn by D.SKILTON	Approved by J.ROBINSON
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Surface Water Flood Hazard Rating
1 in 200 Chance of rainfall event
occurring in any given year (0.5% AEP)

Consultants

CAPITA SYMONDS URS / Scott Wilson
 6 - 8 Greencoat Place
 London
 SW1P 1PL

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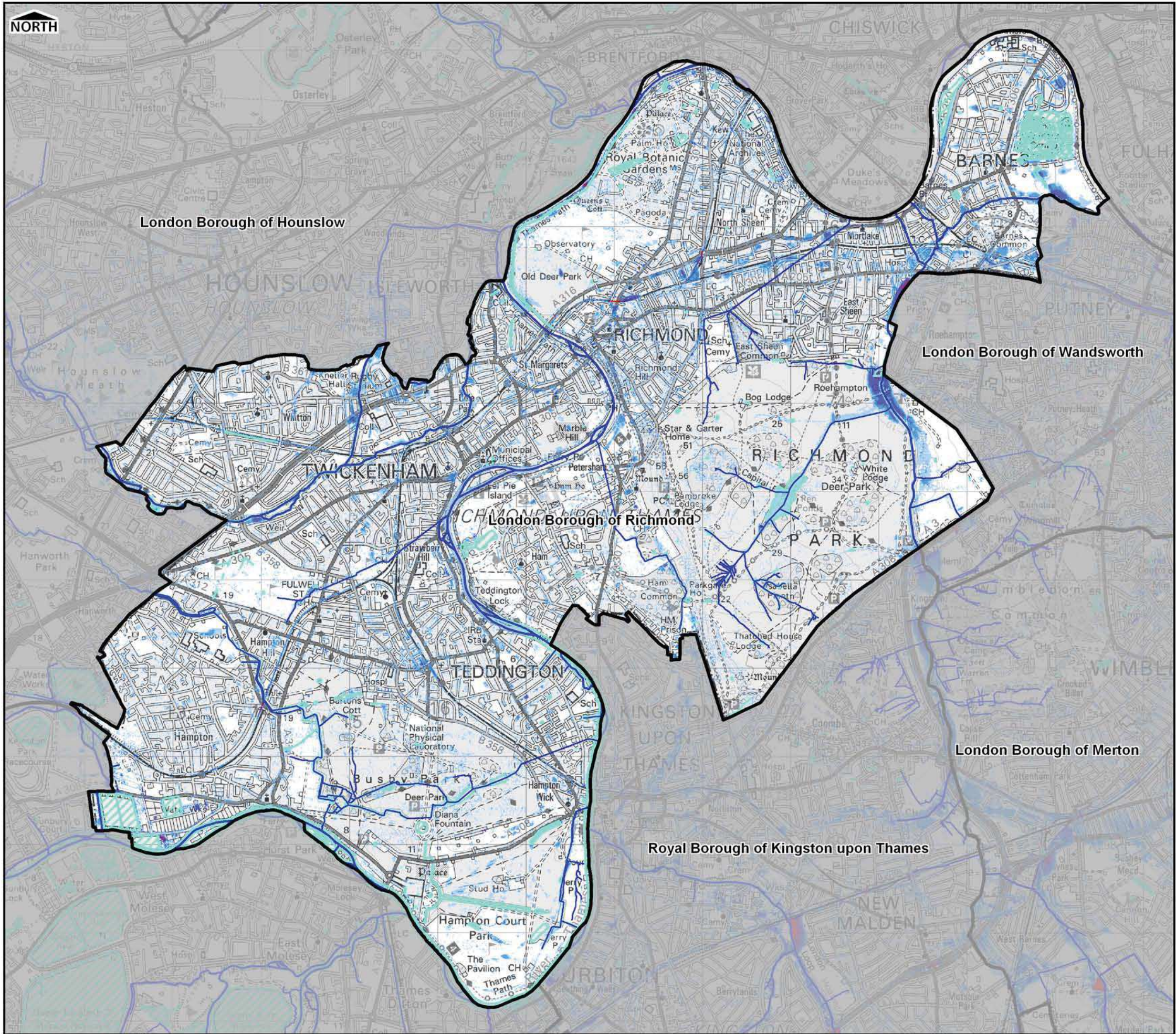
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Environment Agency Thames Water LONDON COUNCILS

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FIGURE 5





Legend

- Borough Administrative Boundary
- Permanent Water Bodies
- Main River
- Ordinary Watercourse

Flood Depth

- <0.1m
- 0.1m to 0.25m
- 0.25m to 0.5m
- 0.5m to 1.0m
- 1.0m to 1.5m
- >1.5m

Notes

1. This map only shows the predicted likelihood of surface water flooding (this includes flooding from sewers, drains, small watercourses and ditches that occurs in heavy rainfall) for defined areas, and due to the coarse nature of the source data used, are not detailed enough to account for precise addresses.
2. Users of this map should refer to section 3.2 of the Surface Water Management Plan for a complete description of limitations and accuracy of the flood/hazard extents shown.
3. This map provides a strategic overview of surface water flood risk and may be subject to further analysis in the future.

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**Surface Water Depth (m) 1 in 100
 Chance of rainfall event occurring in any given year (1% AEP) plus Climate Change**

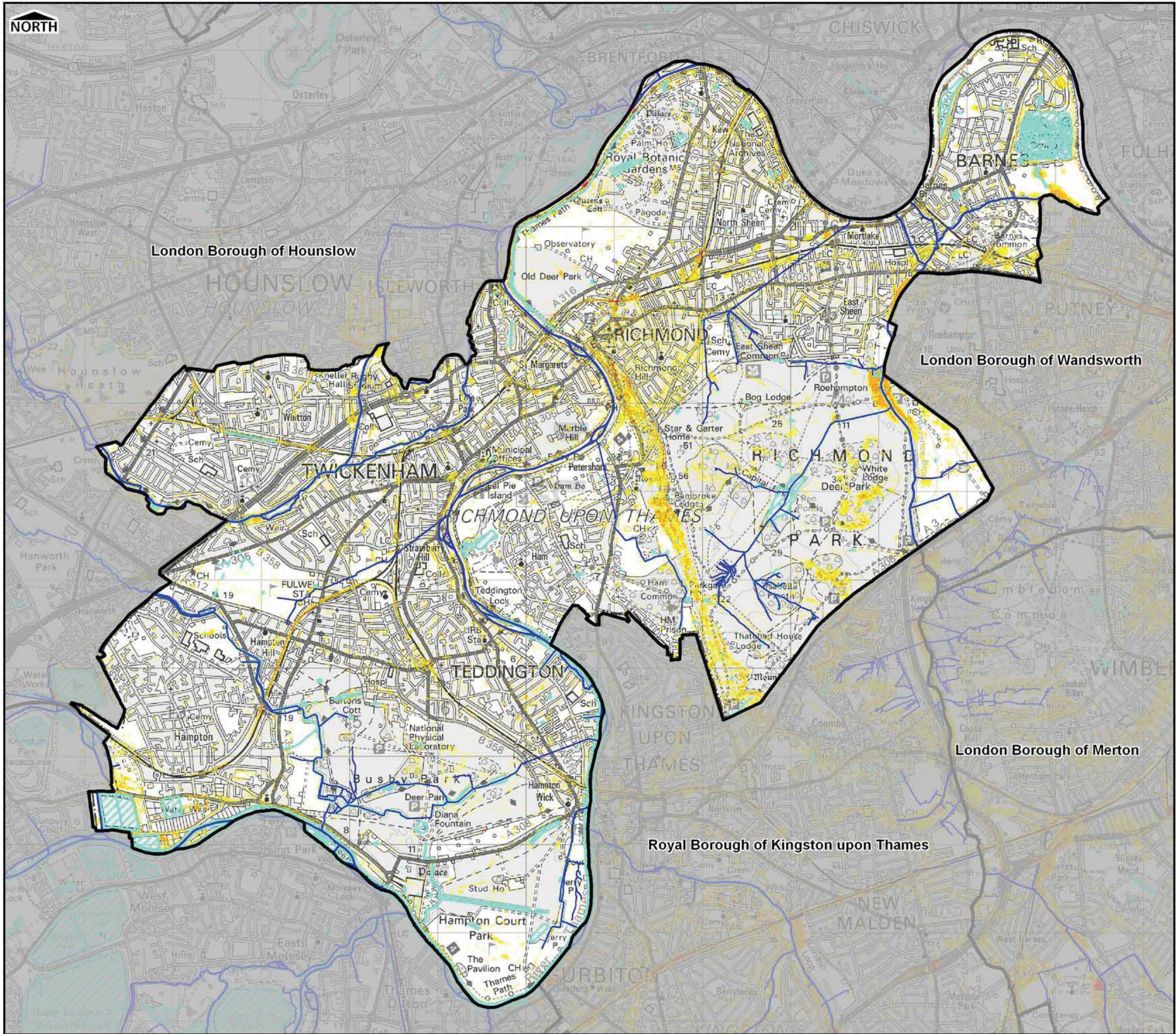
Consultants
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 London
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FIGURE 6





Legend

- Borough Administrative Boundary
- Permanent Water Bodies
- Main River
- Ordinary Watercourse

Flood Hazard

- <0.75 Caution (Very low hazard)
- 0.75 - 1.25 Moderate (Danger for some)
- 1.25 - 2.0 Significant (Danger for most)
- <2.0 Extreme (Danger for all)

Notes

1. Flood Hazard has been defined based upon the joint EA and Defra R&D Technical Report FD2320 (January 2006).
2. Degree of flood hazard can be interpreted as follows:
 - Caution: Flood zone with shallow flowing water or deep standing water
 - Moderate: Flood zone with deep or fast flowing water. Dangerous for children, the elderly and the infirm
 - Significant: Flood zone with deep fast flowing water. Dangerous for most people.
 - Extreme: Flood zone with deep fast flowing water. Dangerous for all (including emergency services)

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Scale at A3 1:45,000	Date 13/05/2011	Drawn by D.SKILTON	Approved by J.ROBINSON
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**Surface Water Flood Hazard Rating 1 in 100
 Chance of rainfall event occurring in any given year (1% AEP) plus Climate Change**

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FIGURE 7